Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION - MARCH 2023

F.Y. B.Tech (C M, E) Sem I 14/12/22 3/3/23

Program: First Year Engineering (C-M-E) **Duration: 3 Hours**

Course Code: BS-BT101 **Maximum Points: 100**

Course Name: Differential Calculus and Complex Numbers **Semester: I**

Note:

1. **Attempt Any Five Questions**
2. **Answers to the sub questions should be grouped together**

		Questions	Points	CO	BL	Module
1	a	If $u = f(r^2)$, $r^2 = x^2 + y^2 + z^2$ Prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 4r^2 f''(r^2) + 6f'(r^2)$	6	CO2	BL5	2
	b	Expand $2x^5 - 3x^4 - 4x^3 + x^2 + 3x + 2$ in positive powers of $(x+2)$	6	CO2	BL5	1
	c	Prove that $\cos^5\theta \cdot \sin^3\theta = \frac{-1}{128}[\sin 8\theta + 2\sin 6\theta - 2\sin 4\theta - 6\sin 2\theta]$	8	CO3	BL3	4
2	a	Find the smallest positive root of $x^2 - \log_e x - 12 = 0$ by False Position method.	6	CO4	BL5	6
	b	If $\cos(\alpha + i\beta) = x + iy$, Prove that (i) $\frac{x^2}{\cosh^2\beta} + \frac{y^2}{\sinh^2\beta} = 1$ (ii) $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$	6	CO3	BL2	5
	c	If $z = x^n f\left(\frac{y}{x}\right) + y^{-n} g\left(\frac{x}{y}\right)$, prove that $x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x \partial y} + y^2\frac{\partial^2 z}{\partial y^2} + x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = n^2 z$	8	CO2	BL3	3

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION - MARCH 2023

3	a	Prove that $\tan^{-1}\left[i\left(\frac{x-a}{x+a}\right)\right]=\frac{i}{2}\log\frac{x}{a}$	6	CO3	BL4	3
	b	If $u\cdot x+v\cdot y=0$ and $\frac{u}{x}+\frac{v}{y}=1$; prove that $\frac{u}{x}\left(\frac{\partial x}{\partial u}\right)_v+\frac{v}{y}\left(\frac{\partial y}{\partial v}\right)_u=0$	6	CO2	BL5	2
	c	If $y=x\log(x+1)$, prove that $y_n=\frac{(-1)^n(n-2)!(x+n)}{(x+1)^n}$	8	CO1	BL5	1
4	a	Solve the equation $3x-\cos x-1=0$ using Newton-Raphson method	6	CO4	BL5	6
	b	If $y=\tan^{-1}\left[\frac{a+x}{a-x}\right]$, when a is constant. prove that $(a^2+x^2)y_{n+2}+2(n+1)xy_{n+1}+n(n+1)y_n=0$	6	CO1	BL3	5
	c	If $z=\cos\theta+i\sin\theta$, Prove that $(i)\ \frac{2}{1+z}=1-i\tan\left(\frac{\theta}{2}\right)$ and $(ii)\ \frac{1+z}{1-z}=i\cot\left(\frac{\theta}{2}\right)$	8	CO3	BL3	4
5	a	Solve the following system of equations using Gauss Jacobi Iterative method $28x+4y-z=32$ $x+3y+10z=24$ $2x+17y+4z=35$	6	CO4	BL4, 5	7
	b	Find all the roots of the equation $x^5+1=0$	6	CO3	BL4	5

END SEMESTER EXAMINATION - MARCH 2023

	c	Find all the stationary points of the function $f(x,y)=y^2+4xy+3x^2+x^3$ and examine whether the function is maximum or minimum at those points.	8	CO2	BL2, BL4	3
6	a	If $\tan(x+iy)=\sin(u+iv)$, Prove that $\frac{\sin 2x}{\sinh 2y}=\frac{\tan u}{\tanh v}$	6	CO3	BL5	4
	b	Evaluate $\int_0^1 \frac{1}{\sqrt{x^4+1}}dx$, using Trapezoidal and Simpson's one-third rule with $h=\frac{1}{4}$	6	CO4	BL3	6
	c	If $x=u+v+w,\quad y=uv+vw+uw,\quad z=uvw$, Prove that $x\frac{\partial\phi}{\partial x}+2y\frac{\partial\phi}{\partial y}+3z\frac{\partial\phi}{\partial z}=u\frac{\partial\phi}{\partial u}+v\frac{\partial\phi}{\partial v}+w\frac{\partial\phi}{\partial w}$ where $\phi=\phi(x,y,z)$	8	CO2	BL3, BL5	2
7	a	Prove that $\frac{x}{e^x-1}=1-\frac{x}{2}+\frac{x^2}{12}-\frac{x^4}{720}$	6	CO1	BL2, BL3	1
	b	Solve the following system of equations using Gauss Seidel method $20x+y-2z=17$ $2x-3y+20z=25$ $3x+20y-z=-18$	6	CO4	BL5	7
	c	State and Prove Euler's Theorem for function of THREE variables	8	CO3	BL1, BL3	2

BharatiyaVidyaBhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester – 10th March 2023 Examination

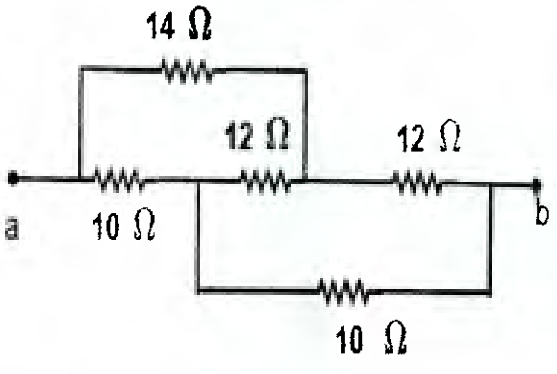
F.Y. (C/M/E) Sem I 10/3/23

Class: FY (C/M/E)
Course Code: ES-BT102
Course Name: Basic Electrical Engineering

Duration: 3h
Semester: I
Maximum Points: 100

- Attempt any ***Five*** questions.
- Make suitable assumptions wherever necessary.

Q.No	Questions	Points	CO	BL
Q1. (a)	State Maximum Power Transfer Theorem and also derive the condition for maximum power to be transfer to happen.	5	1	2
Q1. (b)	A coil of resistance 3Ω and inductance of 0.22 H is connected in series with imperfect capacitors. When such a series circuit is connected across a supply of 200V ,50 Hz it has been observed that their combined impedance is 3.8+j6.4 Ω. Calculate capacitance and its equivalent resistance.	5	2	4
Q1. (c)	Compare an ideal and a practical transformer.	5	3	2
Q1. (d)	Find R_{ab} for the circuit given below	5	1	4

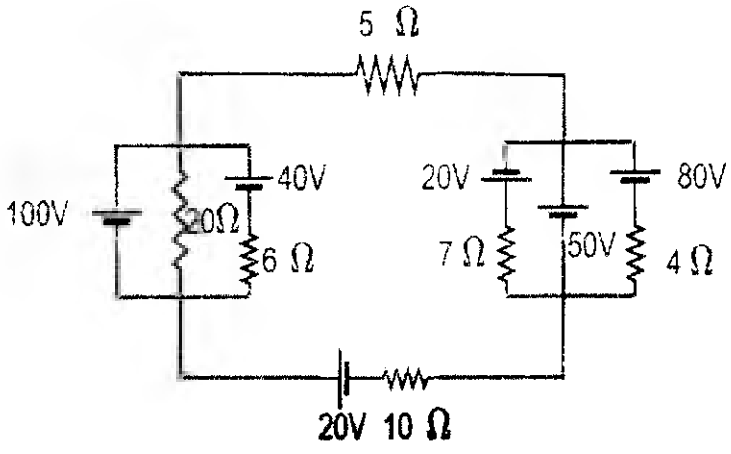


Q2.(a)	Using Superposition Theorem find current through **5Ω** resistor.	8	1	4

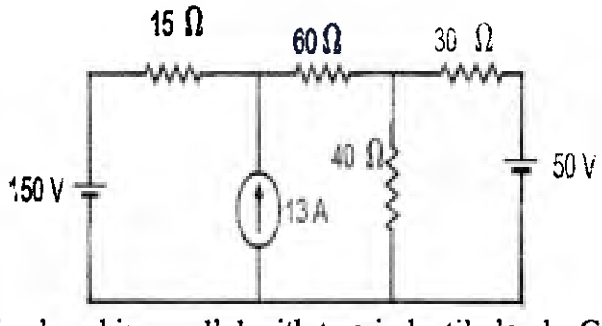
SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

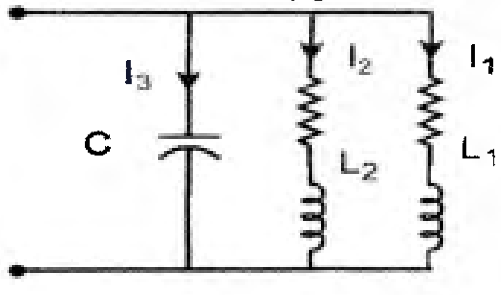
End Semester – 10th March 2023 Examination



Q2. (b) Determine Thevenin's Equivalent circuit and hence find current through 30Ω resistor in the network as shown below, — 8 — 1 — 4



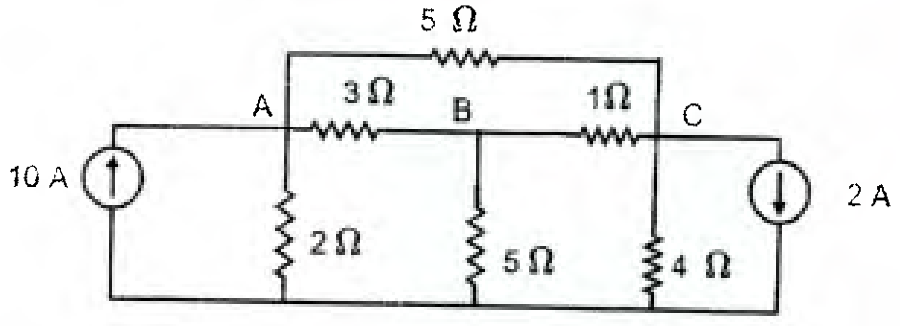
Q2. (c) A capacitor is placed in parallel with two inductile loads. Current I_1 through first inductor is 30A at 30° lag and the current I_2 through second is 50 lag 60°lag. What must be the current I_3 in the capacitor so that the current in the external circuit is of unity power factor. — 4 — 2 — 4



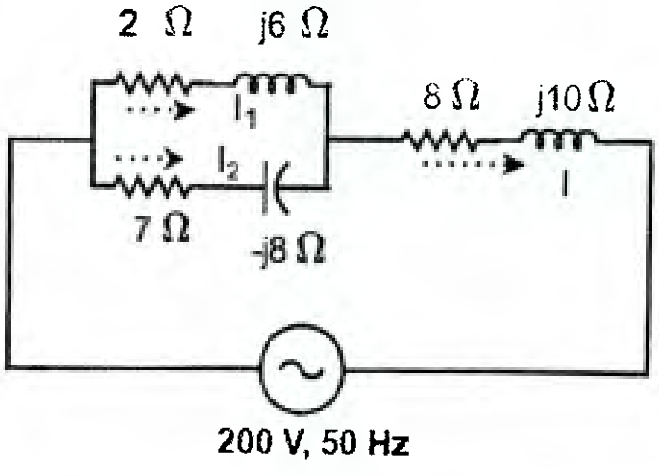
Q3. (a) A resistance and capacitance in series connected across 250 V supply draws 5A current at a frequency of 50 Hz. When frequency is increased to 60 Hz it draws a current of 5.8 A. Find the values of R and C . Calculate the active power, reactive power and apparent power in the second case. — 8 — 2 — 4

Q3. (b) Use Nodal analysis to find the node voltages V_A, V_B and V_C and also find — 8 — 1 — 4

current through 3 Ω resistor in the circuit.



Q3. (c)	Each of the delta connected load consists of an impedance of (5+j20) Ω. The line voltages are 400V. Find (i) phase voltage, (ii)line current, (iii)phase current, (iv)power consumed, (v) reactive power and (vi)apparent power.	6	2	4
Q4. (a)	For a R-L-C series network draw impedance triangle, voltage triangle, and power triangle when $X_L=X_C$. Also give equation for apparent power, real power and reactive power.	4	2	2
Q4. (b)	A current of 5 A flows through a non- inductive resistance in series with a choking coil supplied at 250 V,50 Hz. If the voltage across the coil is 200V and 125 V across non inductive resistance. Calculate: (i) Parameters of the coil. (ii) Power absorbed by the coil and that by the circuit. (iii) Power factor of the circuit and that of the coil.	8	2	4
Q4. (c)	For the series parallel circuit shown below, find: (i) Supply current ***I*** (ii) Impedance of the circuit (iii) Currents in two parallel branches I_1 and I_2 (iv) Power factor of the circuit and of parallel branches.	8	2	4



Q5. (a)	Obtain the relation between the line parameters and phase parameters of the three-phase star connected load. Draw a neat phasor diagram for the	8	2	2

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester – 10th March 2023 Examination

same.

Q5. (b)	A balanced Star connected load is connected to a 400V,50 Hz, three phase A.C. supply. A phase current of 80 A at 0.8 p.f is drawn by the load. Find: (i) Phase voltage. (ii) Total active power consumed. (iii) Parameters of the load.	6	2	4
Q5. (c)	Each of the star connected load consists of a non-reactive resistance of 100Ω in parallel with a capacitance of 31.8μF. Calculate the line currents, power absorbed, total KVA and power factor when connected to a 420 V, 3-φ , 50 Hz supply.	6	2	4
Q6. (a)	OC and SC test on a 5 KVA , 200/400V ,50 Hz single phase transformer gave the following results. (i) Draw equivalent circuit referred to primary side with all the parameters marked on it. (ii) Calculate the approximate regulation of transformer at full load 0.8 p.f. lagging (iii) Calculate efficiency of the transformer at unity power factor.	10	3	4

OC (LV side)	200V	1A	100 W
SC (HV side)	15 V	10 A	85 W

Q6. (b)	Explain with the help of a neat diagram no load operation of the practical transformer. Draw the phasor diagram of the transformer operating at lagging load.	6	3	4
Q6. (c)	A 30 KVA, 3000/300V, single phase 50 Hz transformer has a primary resistance and reactance of 3.5Ω and 4.5Ω respectively. The secondary resistance and reactance are 0.015Ω and 0.02Ω respectively. Find (i) primary side and secondary side rated current (ii) equivalent resistance and reactance referred to HV side (iii) equivalent resistance and reactance referred to LV side	4	3	4
Q7	Attempt any two: (i) Explain the construction of the dc motor with the help of a neat diagram and also explain its working principle. (ii) Why single-phase induction motor is not self-starting. Explain any one method to make itself starting. (iii) Obtain the condition for maximum efficiency in a single-phase transformer.	10*2	4	2

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination

13th March 2023 F.Y C&M, E) Sem I 13/3/23

Program: UG First Year
Course Code: ES-BT104
Course Name: Engineering Mechanics - I

Duration: 3 Hours
Maximum Points: 100
Semester: I

Notes:

- **Solve any five main questions**
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained, Bloom's Taxonomy Level** and **Performance Indicators**

Q. No.			Points	CO	BL	PI
1	a	State the laws of friction and illustrate with sketches where necessary	5	1, 2	2	1.2.1
	b	Determine the reactions at A and B developed in a simply supported beam of length 6m long, having a point load of 30 kN at 2 m from end A which is a roller support and 50 kN at 2 m from end B which is hinged support. Use the principle of virtual work done.	5	4	3	1.3.1 2.1.1 2.1.2 2.1.3
	c	Identify the zero force members for the truss shown below in Figure 1.	3	3	3	1.3.1

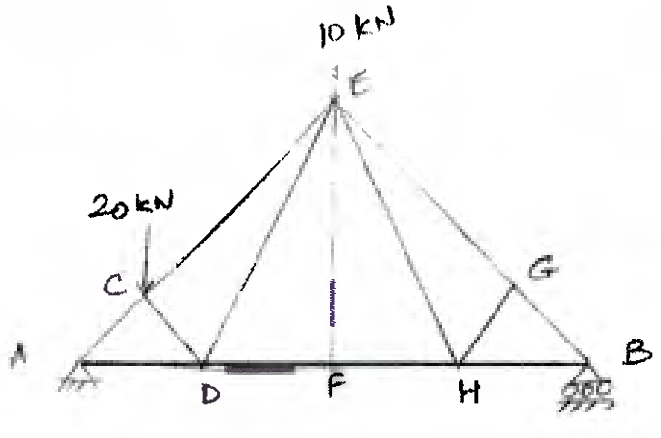


Figure 1.

	d	Find the resultant of the system of coplanar forces acting on a lamina as shown in Figure 2. Each square has a side of 10mm.	7	1	3	2.1.1 2.1.2

		Also determine the distance of the resultant from Point O.				

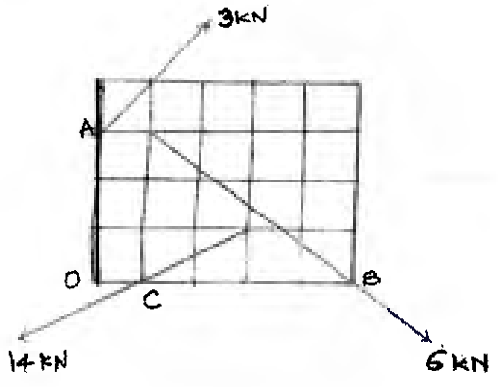


Figure 2.

2	a	Explain the angle of friction and angle of repose with neat sketches	5	1,2	1, 2	1.2.1
	b	A 200 N sphere is resting in a trough as shown in Figure 3. Determine the reactions developed at the contact surfaces. Assume all the contact surfaces to be smooth. Use Lami's theorem.	5	1, 2	3	1.3.1 2.1.3 2.2.3

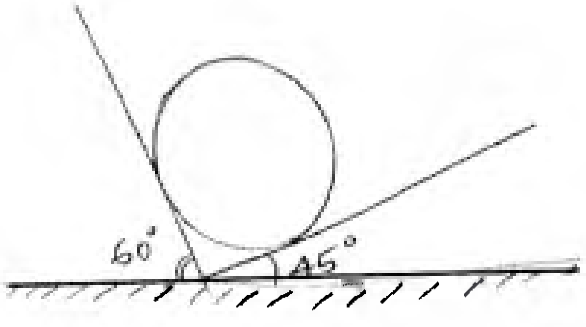


Figure 3.

	c	Determine the support reactions for the system shown in Figure 4	10	2	3	1.3.1 2.1.1 2.1.2

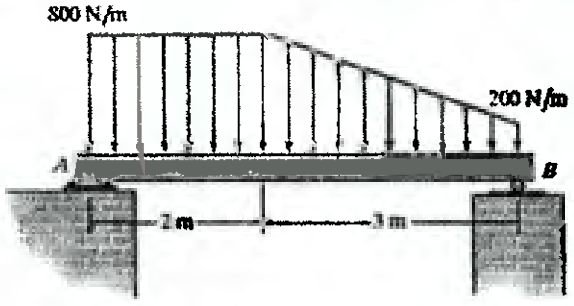


Figure 4.

3	**a**	For Figure 5, determine the forces in each member of the truss using method of joints	**14**	**3**	**3**	**2.2.3**

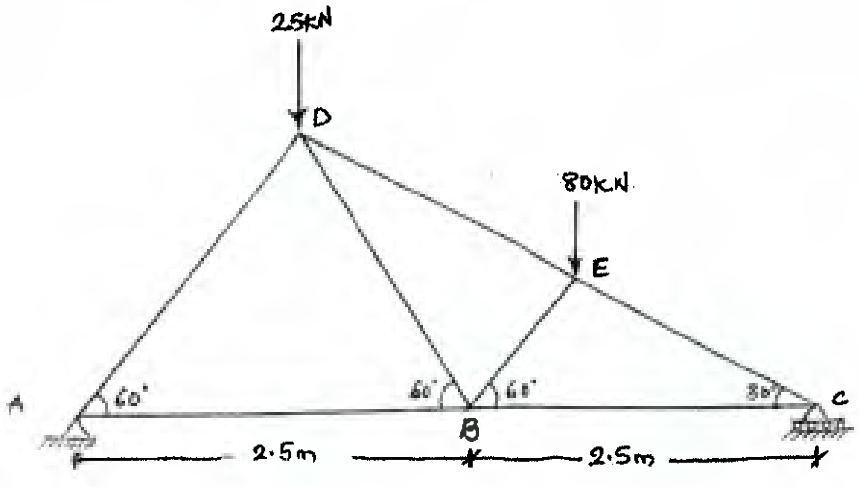


Figure 5.

	b	For Figure 6, determine the forces in members CE, CF and DF of the truss using method of sections.	**6**	**3**	**3**	**2.2.3**

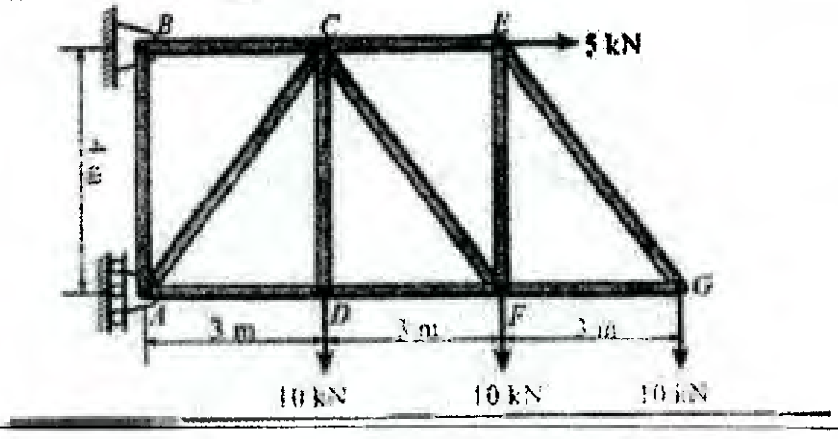


Figure 6.

4	a	Determine the support reactions for the beam as shown below in Figure 7.	15	1, 2	3	1.3.1 2.1.1

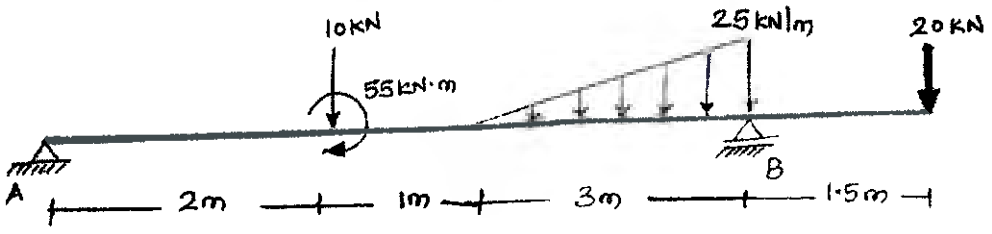


Figure 7.

	b	State and explain Varignon's theorem.	2	1, 2	2	1.3.1
	c	How is a perfect truss different from an imperfect truss?	3	3	2	1.3.1
5	a	A uniform ladder of length 4 m rests against a rough vertical wall with its lower end on a rough horizontal floor, the ladder being inclined at 50° to the horizontal. The coefficient of friction between the ladder and the wall is 0.3 and that between the ladder and the floor is 0.5. A man of weight 500 N climbs up the ladder. What is the maximum length along the ladder that the man will be able to climb before the ladder slips. The weight of the ladder is 1000 N.	5	2	4	2.1.2 2.1.3
	b	A string ABCD carries two loads P and Q. If P is 500 N, find the force Q and tensions in strings BC and CD as shown in the Figure 8.	5	2	3	1.3.1

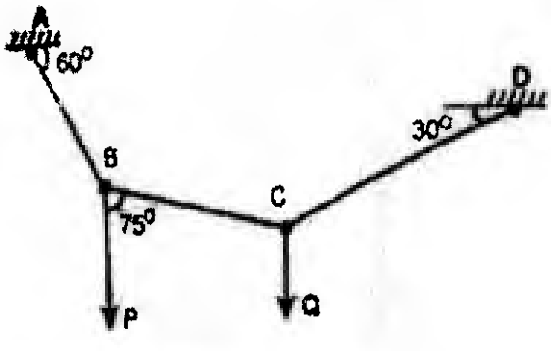


Figure 8

	c	Find the reactions at the support A and C. The point B has internal hinge as shown in the Figure 9.	10	2	3	1.3.1 2.1.1

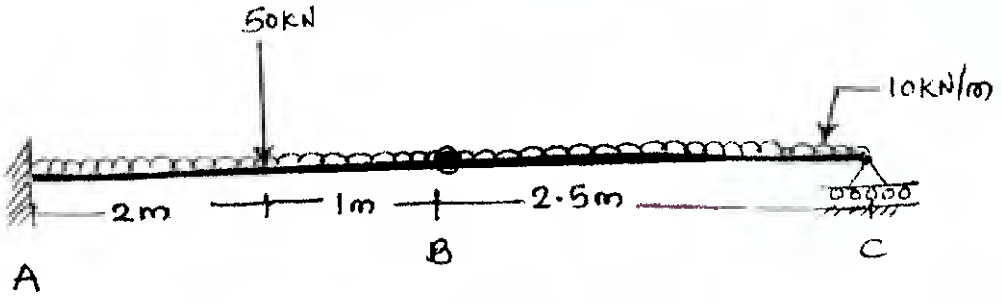


Figure 9

6	a	Two blocks A and B are resting against the wall and floor as shown in Figure 10. Find the minimum value of P that will hold the system in equilibrium. Take μ = 0.25 at the floor, 0.3 at the wall and 0.2 between blocks.	10	2	4	1.3.1 2.1.2

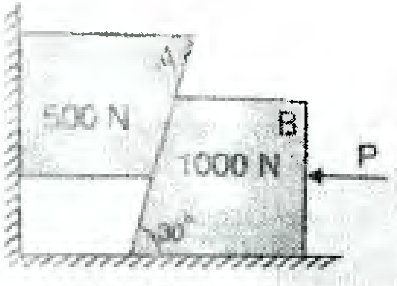


Figure 10

	b	Find the resultant of the force system given in Figure 11.	5	1	3	1.3.1 2.1.2

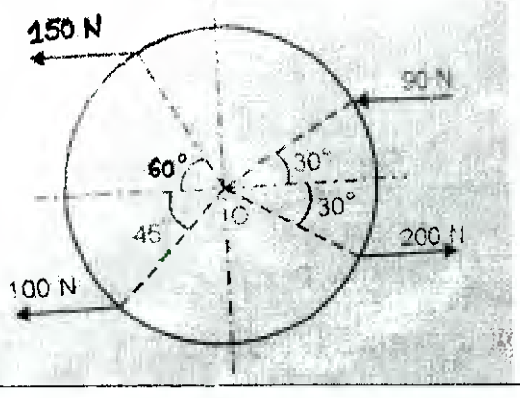


Figure 11

	c	Explain the following types of forces with neat sketches and examples: Coplanar forces, concurrent forces, parallel forces, collinear forces.	5	1	1	1.3.1
7	a	The guy cables AB and AC are attached to the top of the transmission tower as shown in Figure 12. The tension in cable AC is 8 kN. Determine the required tension T in cable AB such that the net effect of the two cable tensions is a downward force at point A. Determine the magnitude R of this downward force	5	2	3	1.3.1 2.1.2 2.2.3

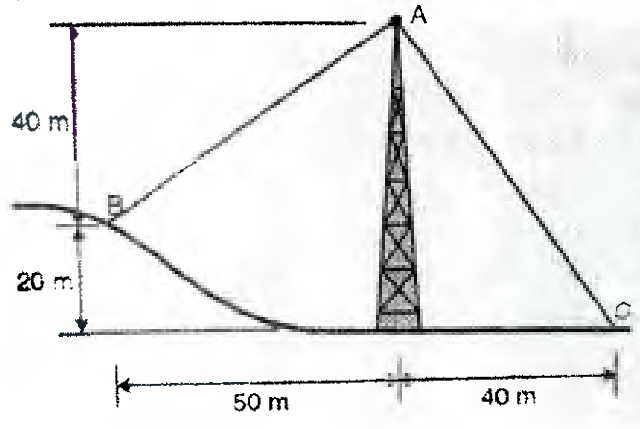


Figure 12

	b	Two identical rollers each of mass 50 kg are supported by an inclined plane and a vertical wall as shown in Figure 13. Assuming smooth surface, find the reactions induced at the points of support A, B and C.	7	1	3	1.3.1 2.1.2 2.2.3

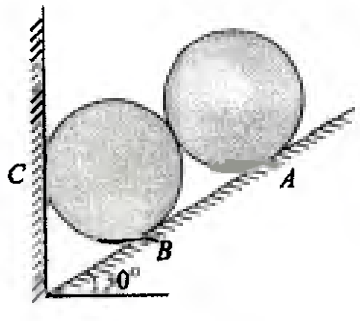


Figure 13.

	c	A body is acted upon by forces as given below. Find the resultant of these forces i) 15 N acting due east ii) 100 N acting 50° north of east	8	1	4	1.3.1 2.1.2 2.2.3

		iii) 75 N acting 20° west of north iv) 120 N acting 30° south of west v) 90 N acting 25° west of south vi) 80 N acting 40° south of east All forces are acting from point O.				

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(Government-Aided Autonomous Institute affiliated to University of Mumbai)
Munshi Nagar, Andheri (West), Mumbai -400 058

End Semester Examination for F.Y.B Tech (Civil/Mechanical/Electrical) Sem I
March 2023

6/3/23

Total Marks: **100** Duration: **3 Hrs**
CLASS/SEM : **F.Y.B Tech (C/M/E)/Sem.-I** COURSE NAME : **ENGINEERING PHYSICS-I**
COURSE CODE: **BSBT105**

- **Question No 1 is compulsory. Answer any FOUR out of remaining SIX questions.**
- **Marks, Module No, Course Outcome number, Bloom's level and Performance indicators are given against the questions.**
- **Diagrams have to be drawn wherever necessary.**
- **Assume suitable data (if necessary) and state your assumption/s clearly.**
- **Marks will be given on the basis of what will be written in the paper irrespective of your intentions!**

Good luck!

		Mod	CO	BL	PI
Q1.	(4 marks) for a to e				
a.	State and derive Bragg's law of X-ray diffraction.	1	1	5	1.2.1
b.	Derive uncertainty relation for energy and time from position and momentum uncertainty expression.	2	1	3	1.1.1 1.2.1
c.	Deduce energy values for a free particle moving along positive X-direction and hence sketch a graph for the same.	3	2	1	1.1.1 1.2.1
d	Draw the following: (203) and [134] in a simple cubic unit cell.	4	3	2	1.1.1 1.2.1
e.	A pure copper wire has a radius of 0.5mm, a resistance of 1MΩ and is 4680km long. Find the resistivity of copper.	5	4	3	1.2.1
Q2..					
a.	(8 marks) Explain Compton effect and hence derive an expression for Compton wavelength. In a Compton collision with an electron, a photon of violet light of wavelength λ = 400 nm is backward scattered through an angle 180°. How much energy is transferred to the electron in this collision? Compare the result with the energy the electron would acquire in a photoelectric process with the same photon.	1	1	3	1.1.1 1.2.1
b.	(8 marks) Explain Heisenberg's uncertainty principle of position and momentum using wave group. Justify your answer to this question by giving both mathematical and physical explanation. The velocity of a proton in an accelerator is known to an accuracy of 0.250% of the speed of light. (This could be small compared with its velocity!) What is the smallest possible uncertainty in its position?	2	1	2,5	1.1.1 1.2.1
c.	(4 marks) Calculate the Ionic Packing Factor of NaCl assuming ionic radii of Na^+ and Cl^- as 0.102 nm and 0.181 nm respectively.	4	3	3	1.2.1
Q3.					
a	(8 marks) Explain de Broglie's hypothesis using Davisson Germer experiment.	2	1	2	1.1.1
b.	(8 marks) Arrive at Schrodinger's one dimensional time independent equation from its time dependent form.	3	2	2	1.1.1

c.	(4 marks) In a semiconductor, the effective mass of an electron is 0.07m and that of a hole is 0.4m, where m is the free electron mass. Assuming that the average time for collision for holes is half that for the electrons, calculate the mobility of holes when the mobility of electrons is 0.8m²/V-s.	5	4	3	1.1.1 1.2.1
Q4.					
a	(8 marks) Using Schrödinger's time independent equation, obtain for a particle in a box of infinite height, its Eigen functions and Eigen values. Sketch the quantized Eigen functions and probability of finding the particle inside the potential well for n=1 and n=2.	3	2	3	1.1.1 1.2.1
b.	(8 marks) Explain an HCP structure by its (a) Co-ordination number and (b) average number of atoms in the unit cell. The distance between middle layer of the hcp cell and top layer just above the first hcp cell is 0.75nm. What is the length of the base diagonal?	4	3	2,3	1.1.1
c.	(4 marks) 100keV electrons are passed through a thin film of metal for which the atomic spacing is 5.5x10⁻¹⁰m. Evaluate the angle of deviation for the first order diffraction maxima.	1	1	5	1.1.1 1.2.1
Q5.					
a	(8 marks) Sketch the important planes in an FCC structure. Also derive their interplanar spacing values. If the radius of Nickel atom which belongs to FCC lattice is 1.24 A°, calculate the planar atomic density of the (110) set of planes of FCC.	4	3	2	1.1.1 1.2.1
b.	(8 marks) Illustrate and explain Hall Effect. Hence obtain relation for Hall voltage and Hall coefficient in terms of current and magnetic field.	5	4	4	1.1.1 1.2.1
c.	(4 marks) A proton is confined in an infinite square well of width 10 fm. (The nuclear potential that binds protons and neutrons in the nucleus of an atom is often approximated by an infinite square well potential.) Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state (n = 2) to the ground state (n = 1).	2	1	4	1.2.1
Q6.					
a.	(8 marks) Explain Fermi level with variation of temperature in an N-type semiconductor. In a solid, there is an energy level lying 0.012eV below the Fermi level. What is the probability of this level being not occupied by electrons at room temperature?	5	4	3	1.1.1 1.2.1
b.	(8 marks) Explain the formation of continuous and characteristic X-rays and sketch the spectra. Sylvine crystallizes in the form of simple cubic structure. The density of sylvine is 1990 kg/m³ and molecular weight 74.6. Determine the principal grating spacing of Sylvine. Also determine the glancing angle at which an X-ray spectral line of wavelength 0.1787 nm is reflected in the third order.	1	1	2,3	1.1.1 1.2.1
c.	(4 marks) Evaluate the first energy level of an electron enclosed in a box of width 10A°. Compare it with that of glass marble of mass 1gm, contained in a box of width 20cm. Can these levels of marble be measured experimentally?	3	2	3	1.2.1
Q7.					
a.	(8 marks) Define Fermi energy level using Fermi function. Explain how does the Fermi level lie at the mid of the forbidden gap for intrinsic semiconductors.	5	4	1,2	1.1.1
b.	(8 marks) Using Heisenberg's uncertainty principle, prove that an electron cannot be a nucleon. An electron has a speed of 600m/s with an accuracy of 0.005%. Calculate the uncertainty with which we can locate the position of the electron.	2	1	3,5	1.1.1 1.2.1
c.	(4 marks) A sample of BCC iron was placed in an X-ray diffractometer using incoming X-rays with a wavelength of 0.1541 nm. Diffraction from the (110) planes was obtained at 2θ=44.704° for the first order. Calculate the radius of BCC iron.	4,1	3,1	3	1.1.1 1.2.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER-I EXAMINATION MARCH 2023

Program: F.Y. B.Tech (C M, E) Sem I 8/3/23 **Duration:** 180 Min

Course Code: BS-BT-106 **Maximum Points:** 100

Course Name: Engineering Chemistry-I **Semester:** I

Instructions:

1 Question No (Q6) is compulsory
2. Attempt any 4 from Q1, Q2,Q3, Q4,Q5
3 Write the chemical reactions wherever necessary

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	Explain different types of units of hardness	5	1,	2	1
b	Write note EDTA method for measurement of hardness in water sample	5	1	1	1
c	Explain the cation and anion exchange resin with suitable chemical reactions. Write regeneration reaction of cation ion and anion exchange resin with its advantages and disadvantages	10	1,2	2	1
Q2					
a	Write a short note on the saponification value of lubricant with its significance	5	2,3	1	2
b	Define lubricant. explain the aniline value of lubricant with its significance	5	3	1	2
c	Why solid lubricants are important? Explain types of solid, semisolid, and liquid lubricants	10	2,3	2	2
Q3					
a	Explain different types of carbon nanotubes with their applications	5	4	2	5
b	Write applications of nanomaterials in a different field	5	4	1	5
c	Explain different approaches to synthesis for nanomaterials and write properties affected by nano size	10	2,4	2	5
Q4					
a	Explain the BOD method for determination of organic matter content in a water sample	5	1	2	1
b	Write a short note on the electrolysis of water for the production of	5	1		1

END SEMESTER-I EXAMINATION MARCH 2023

	hydrogen gas				
c	Describe the basic principle and various components of gas chromatography for the determination of the unknown volatile constituent	10	4	2	4
Q5					
a	Explain different types transitions that take place in UV-Visible spectroscopy	5	2	3	4
b	Write short a note on sewage water treatment	5	1	1	1
c	Describe the Zeolite method for the removal of metal cation ions from hard water with its regeneration reactions	10	1,2	2	1
Q6					
a	Find the acid value of 10.0 mL of oil sample required 3.0 mL of 0.01N KOH to neutralize free acid (density of oil 0.95g/mL)	5	1	3	2
b	Calculate the temporary , permanent and total hardness for the water sample contain $Mg(HCO_3)_2$=50mg/L, $CaSO_4$= 10mg/L $CaCl_2$= 25mg/L	5	1	3	1
c	50 mL standard hard water containing 1.0mg/mL CaCO3 consumed 50 mL of EDTA. 100mL of the unknown hard water sample consumed 50 ml of EDTA using EBT as an indicator. After boiling, filtration of the same hard water(200 mL) consumed 20 mL of EDTA using EBT as an indicator Calculate total, permanent and temporary hardness of water	5	1	3	1
d	A 100 ml of sewage water sample was reflexed with 20 ml of 0.25N K2Cr2O7in presence of dilute H_2SO_4 And Hg_2SO4. The Unreacted dichromate required 10 mL of 0.25N Ferrous Ammonium sulphate solution. 20ml of $K2Cr_2O_7$ and 100ml of distilled water under same condition as the sample required 30.0 ml of 0. 25N ferrous ammonium sulphate solution. Calculate the COD of the sample	5	1	3	1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

Invigilator Name: Signature with date:	**END SEMESTER EXAMINATION MARCH 2023**	Student Name: Seat Number:

Program: First Year B.Tech (Division C) 15/3/23 **Duration:** 03 Hr.
Course Code: ES-BT103 **Maximum Points:** 100
Course Name: Engineering Graphics **Semester:** I

Notes:

1. Attempt any **FIVE** questions.
2. Assume suitable data wherever necessary and justify the same.
3. Create the folder in the **DRIVE C** to save the drawings.
4. Folder name should be end semester exam (ESE) followed by student's seat number (Ex.: **ESE_C2110058**).
5. File name for respective questions should be the question number itself (Ex.: **Q1/Q2**).
6. Each drawing should be **saved separately** mentioning question number as the drawing file name.
7. Q1 and Q2 etc. files must be saved separately in the same folder.
8. Before leaving the examination hall, verify all drawings are uploaded on the server.
9. Save the work frequently.

Q.No.	Questions	Points	CO	BL	PI
1	Construct a diagonal scale of RF = 1:4000 to show metres and long enough to measure upto 500 metres. **OR** Rod AB 85 mm long rolls over a semi-circular pole without slipping from its initially vertical position till it becomes up -side -down vertical. Draw locus of both ends A & B.	20	1,4	3	5.1.1
2	a) Draw the projection of the following points lying on HP and Point Q which is 40 mm behind VP. b) End A of line AB is in HP and 25 mm behind VP. End B in VP and 50mm above HP. Distance between projectors is 70mm. Draw projections and find it's inclinations with HT, VT.	05 15	1,4	3	5.1.1
3	A circular lamina of 50 mm diameter rests on HP such that one of its diameters is inclined at 30^0 to VP and 45^0 to HP. Draw its top and front views in this position.	20	2,4	3	5.1.1

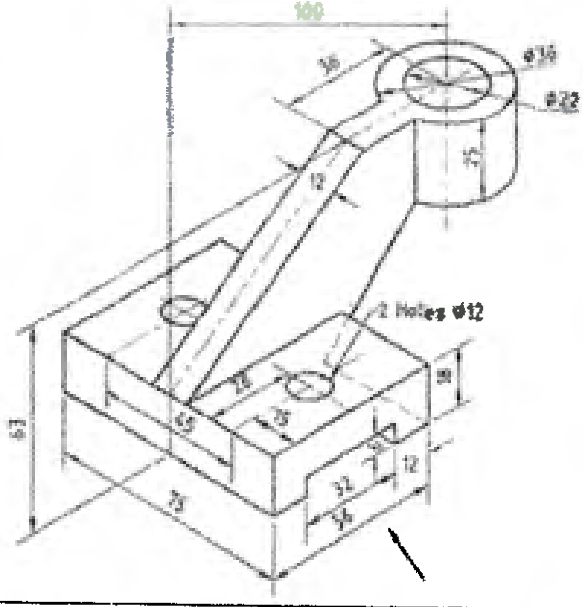
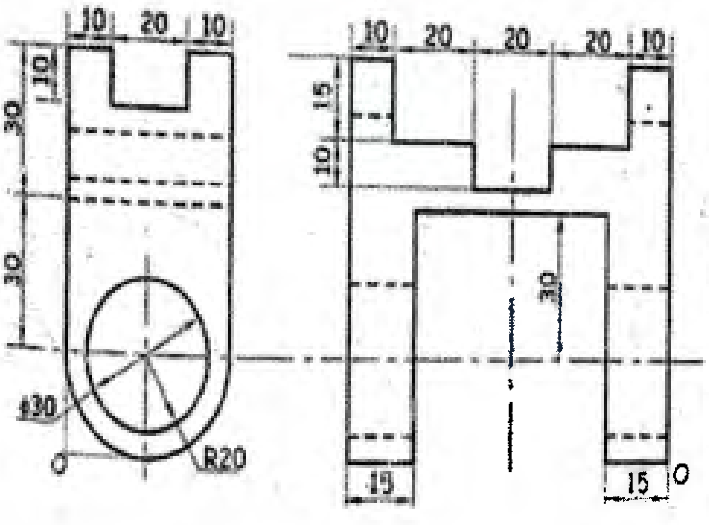
Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION MARCH 2023

4	A cone of base 60 mm diameter and the axis 80 mm long lies on HP with its axis inclined at 45^0 and 30^0 to HP and VP, respectively. Draw the top and front views of the cone.	20	2,4	3	5.1.1
5	Figure shows an isometric drawing of the block. Draw the following views: a) FV looking in X direction b) TV c) SV 	20	3,4	6	5.1.2
6	Draw the isometric view of the following: 	20	3,4	6	5.1.2

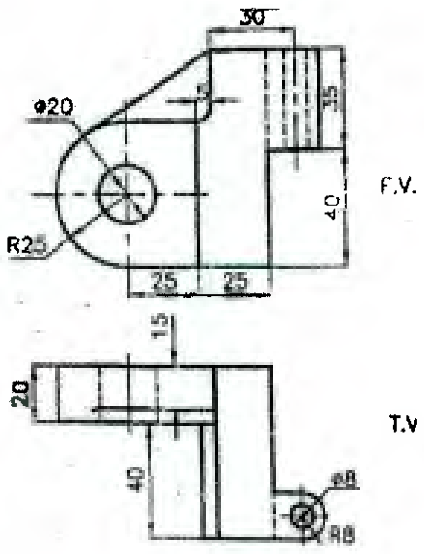
Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION MARCH 2023

7	Figure shows FV and TV of an object. Draw the missing LHSV. 	20	3,4	6	5.1.1